AMC SAFETY DIGEST

NOVEMBER 1970
AMCP 385–98

LET YOUR *Holiday Spirit* REFLECT *Safety!*

GENERAL CHESAREK, Former Commanding General, AMC Presents AMC Safety Awards

AMC Safety Awards were presented at the Commanders' Conference by General Chesarek to CG, MICOM, and CG, MUCOM. The awards ceremony occurred at Arlington Hall, Va., 8 October 1970.

MG E. M. GRAHAM, JR., USA MUNITIONS COMMAND, is shown receiving the AMC Award of Merit of Safety for FY 1970.

MG E. I. DONLEY, CG USA MISSILE COMMAND, is shown receiving the AMC Award of Honor for the best command safety program during FY 1970.

HEADQUARTERS
UNITED STATES ARMY MATERIEL COMMAND
WASHINGTON, D.C. 20315

AMC PAMPHLET Number 385-98 NOVEMBER 1970

The Safety Digest is an AMC Pamphlet prepared by the Safety Office, Headquarters, U. S. Army Materiel Command. Its purpose is to disseminate information which can materially influence and improve safety programs at all Command establishments.

Articles are included to supplement technical knowledge as well as practical knowledge gained through experience. They provide a basis for the further refinement of safety measures already incorporated in operating procedures and process layout. To achieve maximum effectiveness, the Safety Digest should be given widespread circulation at each AMC establishment.

Articles appearing in the Safety Digest are unclassified and are not copyrighted. They may be reproduced as desired in order to bring pertinent accident prevention information to the attention of all employees. The Army Materiel Command Safety Digest should be given a credit line when articles are extracted.

Unclassified material believed to be of interest or benefit to other establishments is welcome for publication in the Safety Digest. Please send articles for review to: U. S. Army Materiel Command Field Safety Agency, Charlestown, Indiana. If possible, include pictures, charts, drawings, and illustrations that clarify and heighten interest in your presentation.

(AMCSF)

FOR THE COMMANDER:

CHARLES T. HORNER, JR.
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Chief of Staff

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Special Distribution 1

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AN INTRODUCTION TO SYSTEM SAFETY

In recent months, much emphasis has been placed on the rapidly expanding field of system safety. The information that follows is an attempt to present some of the basic ideas that underlie this still relatively new concept.

On an elementary level, system safety may be thought of as a methodical process utilizing sound management and analytical techniques to effectively control the causes of real or potential loss throughout total system development.

At this point it should be noted that system safety does not exist in a vacuum. It is actually one of many support disciplines, such as reliability, maintainability, and human factors engineering, that when taken collectively produce a formalized, or systems, approach to development.

Such an approach has evolved from the many difficult problems associated with the demand for accelerated weapons or equipment development. These problems involved the rapid integration of advancing technology into our systems and equipment, the choice of alternative weapons systems to meet new threats, and the development of new ways to control the cost, performance, and time schedules in the development, production, and support of our new weapons or equipment. Consequently, the need has been recognized for life cycle, or "cradle-to-grave", planning to aid in alleviating the vast number of problems that arise during system acquisition.

The Department of the Army (DA) presents the life cycle process by which Army systems are developed, fielded and modified in DA Pamphlet 11-25 (Life Cycle Management Model for Army Systems). Using the DA model as a basis, the Army Materiel Command (AMC) has tailored the Army life cycle to fit its own needs and has put this information into AMCR 11-27 (Conceptual Model, Life Cycle Management of US Army Materiel and AMC Official Milestones).

Currently, the life cycle consists of four parts, or phases, designed to follow the system from its origination to its disposal. Each phase consists of various activities, or milestones, to be accomplished during that particular time frame. Several flow charts, contained in DA Pamphlet 11-25 and AMCR 11-27, show the sequence of the various milestones.

The first life cycle phase is known as concept formulation. During this period potential concepts and technically feasible solutions are developed. This phase may be thought of as consisting of four subphases referred to as concept studies, research planning, system definition, and decision during which time the project is reviewed, and approval is sought to enter into contract definition, the second phase of the life cycle.

During contract definition, engineering and design are verified, planning is accomplished, and proposals for development are examined. When engineering development is to be performed by a contractor, also included are the preparation and distribution of a request for proposal (RFP) to potential contractors, receipt and evaluation of these proposals, and the selection of contractor(s).

Contract definition may be further divided into three subphases.

Phase A (preparation for contract definition) includes preparation and distribution of the RFP, evaluation of proposals, and award of a contract for phase B.

Phase B (contractor definition) includes preparation of selected contractor's proposals and submission of contract definition reports and development proposals by the contractors.

Phase C (review, evaluation and decision) includes evaluation of Phase B reports, selection of a preferred contractor for performing engineering or operational systems development, and ends with the signing of a development contract.

Many and varied activities take place during development and production, the next phase of the life cycle. Basically, these activities include development, testing, type classification, and production, or manufacture, of the system elements. Note that this phase is actually two overlapping efforts, development and production, both of which are contracted for separately.

The fourth, and final, phase, operations and disposal, consists of fielding a unit with the system followed, sooner or later, by the elimination of the item from the inventory.

Insofar as safety input to this life cycle is concerned, there are three basic Army documents. These include:

1. AR 385-16 (Safety for Systems, Associated Subsystems, and Equipment);

2. USAMC Supplement 1 to AR 385-16 (Safety for Systems, Associated Subsystems, and Equipment); and

3. AMCP 385-23 (System Safety Management).

The Department of Defense (DOD) has identified its system safety program policies, objectives, and requirements in MIL-STD-882 (Requirements for System Safety Program for Systems and Associated Subsystems and Equipment).

Each of these documents stresses one point -- the safety effort must begin with concept formulation and extend throughout the life cycle. In other words, there must be total involvement of safety personnel from system beginning to system end.

MIL-STD-882 and AMCP 385-23 present general guidelines, broken down according to the particular phase in this area of safety input to the life cycle.

The depth of accomplishment of each system safety activity is, of course, a function of the specific requirements and peculiarities of the system or project. The activities described in the safety life cycle, however, must be accomplished at some time during the life cycle to provide for the development of a balanced, efficient, and effective system.

A tool that has been developed to aid the safety professional in making his system input is commonly referred to as system safety analysis.

The various techniques comprising system safety analysis are based on a single principle -- accidents, at whatever level, result from system failures. The traditional concept that accidents result from unsafe conditions, unsafe acts, or both is actually just another way of stating that the system, consisting of man, machine, and materials to accomplish a goal, has failed. Systems are programmed to operate under control to produce a certain product or service. Losing this control results in losses -- injuries to people, property loss, and business interruption. Therefore, an acceptable level of safety can be attained through systems analysis and control.

Analysis is then a method of systems review which will identify the loss exposure, analyze causal factors, and develop the potentials and probabilities of the undesired incidents.

Several analytical techniques have been developed and used with varying degrees of success. The three types that will be discussed here are the most common; i.e., greater utilization is made of these approaches.

The first is preliminary (gross) hazard analysis (PHA). PHA, an inductive and qualitative method of analysis, is generally considered to be the initial analytical effort, originating early in the life cycle. It aids in the development of safety criteria to be included in performance or design specifications. The outputs of PHA are safety considerations during trade-off studies and identification of areas of consideration for further analysis.

The failure mode and effects (fault hazard) analysis (FMEA) was first utilized in the 1950s by Grumman Aircraft. It aids in identification of equipment hazards and provides a detailed failure mode analysis.

FMEA begins with the initiation of the design effort and continues throughout the design process. It is completed before the design freeze and must be updated for modification and new data.

Outputs of FMEA include a data source for further analysis and information for safety design guidance.

Bell Telephone Laboratories began to use the fault tree analysis (FTA) in the early 1960s. FTA traces the cause of an undesired event with the results being presented in the form of a "tree".

FTA may be used simultaneously with FMEA, and the individual who uses it generally has a very detailed knowledge of the system. The output of FTA is the determination of cause factors for undesired events.

Note that even though a quantitative; i.e., numerical result is a desirable output from either the FMEA or FTA, the value of the techniques as strictly qualitative sources of information should not be overlooked.

In conclusion, it should be stated that system safety is a way to improved performance, a desire shared by all dedicated safety personnl. Even though there are a few new ideas and techniques involved in this discipline, the basic concept of accident prevention, the cornerstone of the traditional safety program, still prevails. It is only in the approach to a problem that the "old" and "new" differ. In contrast to the traditional, protective approach, the system safety approach is preventative in nature, seeking solutions to problems before they become losses.

NOTE: The AMC Field Safety Agency is presenting four System Safety courses during FY 71. This training is mandatory for all AMC Safety Career personnel.

THE ELEMENTS OF EFFECTIVE FIRE PREVENTION

P. E. McDonnell, Information Officer
Rocky Mountain Arsenal

Rocky Mountain Arsenal recently observed a rather gratifying anniversary. On 30 June 1970, the Arsenal completed its 14th consecutive year without a reportable fire loss. This impressive record has been compiled against the great risk potential associated with extremely hazardous operations such as the processing and handling of various toxic chemical and pyrotechnic-type munitions, as well as missile fuels and insecticides.

In recognition of their outstanding fire prevention and protection program, Rocky Mountain Arsenal was the recipient of the Grand Award (Military Division) in the 1969 National Fire Protection Association (NFPA) Fire Prevention Contest. Presentation of the award plaque was made by Brigadier General Erwin M. Graham, Jr., Commanding General, US Army Munitions Command.

The honors mentioned above do not, however, infer that the Arsenal's fire prevention effort has always been satisfactory. In fact, prior to 1955, fires resulted in damages totaling more than 1.5 million dollars. Recognizing the urgency of fire loss reduction, Arsenal officials initiated positive measures to strengthen the fire prevention program. Members of a reorganized fire department received extensive exposure to pertinent areas of education and training. Plans were developed to engineer fire protection improvements throughout the installation. Local fire prevention standards were revised and enforcement techniques took on a new look. In summary, a proven basic safety management tool, the "Three Es: Education, Engineering and Enforcement," was implemented.

EDUCATION

During the early years of Arsenal operation, fire education was limited to basic elementary training, prepared and presented to firemen by individual fire officers. This educational effort had little background to draw from because of the instructors' lack of experience in chemical, incendiary and explosives operations. New training concepts had to be developed in order to cope with the specific problems of fire prevention in a manufacturing plant with so many inherent hazards.

Invaluable training can be gained through membership with various organizations founded for the betterment of fire prevention and protection. The arsenal utilized NFPA education and training materials and individual firemen joined activities such as the International Fire Chief's Association, the Colorado Fire Chief's Association and other safety groups.

Since 1956, members of the fire department have attended more than 75 technical schools and conferences. These include the Fire Department Instructors Conference, NFPA conferences, fire prevention and protection courses sponsored by Federal agencies, munitions safety courses and various supervisory and leadership conferences.

An extensive internal training program was prepared, drawing upon recently acquired technical training packages and a newly established fire department library. Written, oral and practical tests were given to firefighters to gauge the effectiveness of the training program. Examination results were made a permanent record in the individual's performance file. The level of knowledge and competence of the firemen improved steadily.

Seizing upon an opportunity to further upgrade its firemen, the Arsenal fire department installed an Educational Television receiving station (a part of the Denver Fire Department Network) and now views televised training sessions along with its Denver counterparts. (See page 11, this issue, "Educational Television First Scored by Army Firefighters".)

ENGINEERING

The Arsenal replaced its motorized firefighting equipment with newer types, modified to meet specialized fire protection needs. Subject pumpers are well within the state-of-the-art as far as equipment is concerned.

More than 35 major buildings are protected by sprinkler systems. In addition to building protection systems, several hazardous operations are protected by light-actuated (ultraviolet) deluge systems as well as by "rate-of-rise" heat-actuated systems.

After fire-flow tests were conducted and evaluated, new water mains were installed where necessary providing a more-than-adequate flow throughout the installation. Twenty stationary turret nozzles augmented by a 1500 gpm fire pump were installed in a high risk production area. Portable fire extinguisher locations were carefully reviewed and changes were made in compliance with applicable standards. The engineering effort extended into the modernization of the installation fire alarm system.

ENFORCEMENT

After training and education became firmly rooted, the inspection program was reorganized and well-trained inspectors were assigned to perform the fire inspection mission. Inspection manuals, codes and guideline usage were maximized.

New Post fire regulations were written and existing regulations were revised. The fire department was given absolute authority over all hazardous cutting and welding operations and inspects heat-producing equipment prior to usage. The fire chief exerts strict control over handling and storage of flammable liquids and reviews all building/facility designs and operating procedures for adequacy of fire prevention and protection input.

A Area fire marshals perform delegated duties in their major areas of responsibility. In addition to observing operations and facilities to assure compliance with fire safety requirements, the area fire marshals schedule fire prevention training and fire evacuation drills for their personnel.

In addition to education, engineering and enforcement, there are two more "E-factors", enthusiasm and effort, whose presence played an important role in the Arsenal's fire prevention achievements. Enthusiasm, as a product of fire prevention publicity, has paid untold dividends. Many available means of reaching the individual have been employed. News articles, roadside and building signs and displays, bulletin boards, movies, talks and demonstrations have all been attention-getters. An employee cannot help but know when Fire Prevention Week or Spring Clean-Up Month occurs, as he is bombarded with publicity and displays. Holiday fire safety and seasonal fire hazards are heavily emphasized.

With the sweat and toil implied by the terms "education, engineering, enforcement, enthusiasm and effort", Rocky Mountain Arsenal has literally pulled itself up by its own bootstraps. Rising from fire losses too large to be tolerated in 1954 to an NFPA contest winner in 1969 is an accomplishment of pride for all Arsenal personnel. Much effort has obviously been expended. The continuing force for self-improvement by an Army installation with a determined fire department in the lead has resulted in achievement of the seemingly impossible.

Firemen undergo practical training in order to maintain their operational readiness.

Advertising fire prevention takes on many forms. Here we see the use of pamphlets.

A fireman peruses over a periodical in the fire department library.

EDUCATIONAL TELEVISION FIRST SCORED BY ARMY FIREFIGHTERS

The Army's Rocky Mountain Arsenal presently is involved in a pioneer experiment in the field of educational television.

In close coordination with the Denver Fire Department, a closed circuit television receiver station has been installed at the arsenal's fire headquarters. This station is an integral part of the first fire department operated television network in the United States, and Rocky Mountain Arsenal is believed to be the first federal installation to be so equipped.

Coordinated planning for mutual aid is imperative since Rocky Mountain Arsenal is located immediately adjacent to the city of Denver and the heavily traveled Stapleton International Airport. To this end the city has taken a major step by narrowing the communications gap with this closed circuit television network. The Army, in fulfilling its safety responsibility to the community, is taking an important step by becoming a partner in this new concept in fire department training.

Daily training sessions are telecast covering a broad spectrum of subjects of interest and value to firefighters. With this network the same subject can be presented at the same time to each man in every fire station by the same instructor Well known speakers and educators in the field of fire prevention and in related fields appear frequently on the comprehensive, carefully planned programs. This alleviates a major problem of coordinating training for small groups of men in widespread locations, as in the fire service.

Other planned uses for this medium include Civil Defense communications, both for training and for actual Civil Defense and police operations during natural disasters or civil disorders. The fire department will be able to telecast from the scene of major fires and other emergencies, in order that others not directly involved will have an on-the-spot picture of the situation. A city-owned, police-operated helicopter has been equipped with television cameras and is capable of giving good aerial coverage of almost any situation.

Ultimately a receiver will be installed in every fire station in the city of Denver and in many of the adjacent communities. When this was written only six Denver fire stations and four district police stations have been equipped to receive telecasts. Amazingly, not one cent of taxpayer money has yet been spent on this network except the Rocky Mountain Arsenal's equipment. In order to get the project moving the Denver firemen solicited voluntary contributions. Later a large grant was received from the Bonfils Foundation. Nearly $100,000 has been expended so far, but many thousands more will be needed to complete this far-reaching enterprise.

The future and scope of this network is nearly unlimited and will grow in proportion to the enthusiasm and impetus generated by those who become involved in its evolution.

NATIONAL SAFETY COUNCIL AWARDS

Picatinny Arsenal was advised that the National Safety Council Award of Honor was approved for operating 11,503,969 man-hours without a disabling injury from 17 June 1969 to 5 April 1970.

Ravenna Army Ammunition Plant, Firestone Tire and Rubber Co., was presented the NSC Award of Honor for its 1969 Safety Program on 29 June 1970.

Personnel of both the above installations are congratulated for their contributions to the AMC and Army safety programs.

CHEMICAL CURTAIN

Bureau of Motor Carrier
Safety Bulletin

By now everyone is aware of the "Berlin Wall," the "Iron Curtain," and the "Bamboo Curtain," created by man to divide different political ideologies. Today a new curtain is being created, only this one divides the real and the unreal. The "Chemical Curtain"; it's not made of iron, satin or wool. This curtain is made of tiny objects called pills; pills for pep, pills to calm down, to gain weight, to lose weight. When medically prescribed under controlled conditions, these drugs serve a useful purpose. But today, more and more people are taking these pills without medical prescription or supervision to combat fatigue, ease worries, induce dreams, change moods, but most of all, TO ESCAPE FROM REALITY!

The illicit users of these pills claim what they do with their lives is a matter of individual choice, a point we will not debate. But when drivers under the influence of drugs operate motor vehicles and endanger the safety of the public on the highway, we can and must speak up. A striking example is the truck driver that takes stimulants to stay awake so he can drive longer than the ten-hour maximum permitted by the Motor Carrier Safety Regulations of this Bureau. Amphetamines and other related drugs are used by these drivers in an attempt to counteract extreme fatigue and, so they think, to increase alertness and awakeness. These pills are sometimes called "bennies," "pep bills," "footballs," "drivers," and sundry other names. They create a chemical curtain behind which drivers attempt to hide from reality. . . . the reality that their mind and body, pushed beyond safe limits, are fatigued. Little do they realize that the stimulant introduced into their system lasts but so long, after which, the curtain disappears and the reality of fatigue returns. To prolong their pseudo-euphoria, they consume more and more pills, until their nervous system, benumbed by these concoctions, may allow them to see hallucinatory objects. The white line on the highway may become two or three lines. . . . Approaching car lights may suddenly multiply and appear to be several cars. Drivers have been known to start imagining someone was chasing them or shooting at them. Continuous over-dosage has, on occasion, rendered drivers unconscious, releasing a driver-less vehicle on the highway. This Bureau has investigated accidents where drivers, while under the influence of

these drugs, have killed or maimed themselves or innocent users of the highways. Should this type of person continue driving commercial vehicles? What can we do to stop them?

This Bureau has proposed regulations that would absolutely prohibit the use and possession of these drugs by commercial drivers. But passing a regulation will not erase the problem or stop the illicit use of dangerous drugs. Motor carriers, unions, allied associations, and trade journals are urged to impress upon drivers not only the mental and physical consequences that may occur, the irreparable damage to themselves and others, but also the legal consequences thay may result. DRIVERS MUST REALIZE THAT WHEN THE CHEMICAL CURTAIN FALLS, THERE IS NO ENCORE!

THREE SUGGESTIONS FOR SAFE WINTER DRIVING

R. E. Johnson
Safety Services Superintendent
Olin Corporation
Badger Army Ammunition Plant

During the coming months, you, as a supervisor, will have special responsibilities with respect to your employees who operate vehicles. Driving hazards will be more numerous than in other seasons. These hazards are always present and are difficult to defend against.

There are three winter driving hazards that you can help your workers avoid by counseling them collectively and individually whenever you send them on a trip. You will also be a safer driver if you will take pains to practice your own advice.

1. Vision - No vehicle should be moved unless there is clear vision to all sides. This means "clear". A foggy inside of window glass cuts down vision about as much as frost on the outside.

2. Road Conditions - Where roads are slick, don't ask the employee to hurry or "run down" to do a job. Word your instructions so that there is no mistaking your desire that the employee proceed carefully.

3. Ventilation - No inspection program will completely eliminate the chance of carbon monoxide leaking into the passenger compartment of a motor vehicle. The operator must help himself. No person should be in the passenger compartment with the motor running and without a window slightly open. Counsel employees in this matter, especially when they are starting out with a cold vehicle, and be alert to correct anyone violating this life-preserving rule.

By being careful yourself and by making it known you want care by your employees, an understanding will be achieved that will provide a stronger defense against winter hazards.

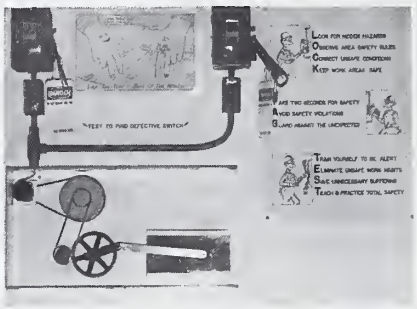
As a last thought, consider the employee off the job. When the weather is tough, it might help to include in your good-bye at the end of the shift a "take care" against the road hazards on his trip home.

DON'T GUESS - LOCK, TAG AND TEST

Another step in the development of an injury-free performance by Lake City Army Ammunition Plant employees is the Lock, Tag and Test Procedure. The Lock and Tag Procedure, utilized for several years, has been expanded to include testing prior to performing any work on the machinery or equipment.

The purpose of the revised procedure is to provide assurance that all moving parts are stopped and that they will not move while work is being accomplished on the machine. Testing after locking and tagging the master control switch or valve will ascertain the existence or nonexistence of faulty control mechanisms or circuits. This testing function is the final touch before opening the machine guards and proceeding with maintenance. Should the start button inadvertently be pressed, no injury will result from energized rams, feed arms or cutters because you have locked, tagged and tested your machine.

To illustrate the importance of testing, a display board was exhibited for a few days in the lobby of each main manufacturing building. This display actually served as a practical demonstration of what can happen when locked and tagged master controls are not tested. (See photo)



When the "start" button is touched, the gears turn slowly and the arm attachment opens a sliding door revealing a simulated hand with mangled fingers. All moving parts of the mechanism are covered with safety glass.

Lake City employees were encouraged to use the display in order to become "believers", or as a recent television detergent commercial puts it, "I'm from Missouri and I have to be shown". Although not an innovation, the testing aspect and its promotional display have been developed as an aid to the accident prevention program. Success of such an effort is dependent upon understanding and usage. So, don't guess - Lock, Tag and Test!

Lake City Army Ammunition Plant

SINCERITY IS A SAFETY TOOL

Some safety personnel talk of coping with difficult situations and handling operating personnel as if they were manipulating puppets. The route to success they have mapped for themselves involves learning the "tricks of the trade" that will permit them to get the job done in their own way. The way selected is likely to be one that will make the safety man look good and that will advance his career.

The safety engineer or safety director who develops such an attitude makes a serious mistake. A really successful safety program does not depend upon one person being recognized as "the expert". At least some of the people in positions of responsibility will recognize the attempt that is being made to manipulate them. Their response is likely to take the form of resistance or slacking off, if they suspect the safety man is operating for personal benefit.

The safety director who is most likely to be effective is the one who sincerely desires the maximum degree of safety for the personnel of his organization. The people with whom he works will perceive this and will respond. His good will and good intentions will come through clearly. When they believe he is giving as much or more than they are, they will more readily make the efforts for safety asked of them.

Here are suggestions of ways in which you can show your sincerity:

Develop a sincere desire to secure the maximum degree of safety for your installation and its personnel. These are the true reasons for your employment in your present job.

Treat all the people in all the elements of your organization fairly, honestly and considerately. You are charged with promoting the well being of every individual on the post.

Be sincere and direct in your dealings with your "customers".

Do not avoid your responsibility by standing on the bare policy that, "The supervisor is responsible for the safety of his personnel." Complete the statement by adding, "And I am responsible for helping him to make them safe."

Avoid creating the impression with the supervisor that you are giving him orders on what he can do or how he can do it. Giving orders is beyond the scope of your authority. You can advise and help him.

Avoid making suggestions or recommendations which cannot be backed up by recognized policy, standards or demonstrated experience.

Be open-minded and ready to accept new and better ideas regardless of the individual or level at which they originate.

Avoid with utmost care any action or mien that may create the idea that you are a snoop or troublemaker.

Avoid tactless criticism even when the fault may be apparent. This will only anger those who are criticized and it is likely to make your safety job more difficult.

Examine your motives before you make a suggestion during the course of an inspection. Are you really being helpful to the other fellow? Perhaps you are really trying to make yourself look knowledgeable and good. Be very careful.

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SNOW-GRIP TIRES AFFECT YOUR SPEED

E. W. Wolfe, Safety Officer
Scranton Army Ammunition Plant

State Police from Wyoming Barracks, Luzerne County, Pennsylvania, have issued this warning to winter drivers.

Speedometers are generally calibrated for operation with conventional tires. When new snow-grip tires are used, a car will move about five miles per hour faster than the speedometer indicates in the speed range of 55 to 65 miles per hour. To avoid exceeding posted speed limits, cars equipped with snow-grip tires should be operated about five miles per hour below the posted limits.

In addition to exceeding posted speed limits while traveling in the 55 to 65 miles per hour range, the motorist whose car is so equipped has increased the length of highway needed for stopping his car safely.

TIMBER-R-R-R-R

W. E. Backler, Forester
J. V. Carano, Safety Engineer
Ravenna Arsenal, Inc.
Ravenna Army Ammunition Plant

Many installations are located in areas which possess vast timberlands. In an effort to preserve such natural resources, land conservation programs are implemented. One phase of such programs which can be particularly hazardous is the felling of trees. Here are a few tips as related to felling and woods safety:

Felling Technique

Before starting the felling operation, the tree should be sized up to determine its lean and crown shape, and the wind direction should be noted. All of these factors will help to determine the direction of fall and the placing of the undercut. A tree should not be felled opposite to its lean, against a strong wind or to the opposite side of a heavy crown unless help is given by wedging, pushing or pulling of the tree. A straight even-crowned and sound tree in a calm atmosphere may be felled in any direction by the proper placing of the undercut. The area around the tree to be felled should be cleared of small trees, brushes and branches so that the worker will not be hampered while making the necessary cuts.

Tree Size for Undercutting

All single stem trees, four inches diameter breast height and over, except those in thick stands and clumps, will be undercut before making the backcut or severing cut. The stem may be cut at a slant, if determined safe.

Trees six inches diameter breast height or less in a thick stand may be cut on a slant. Trees in a thick stand have very small crowns and do not have sufficient weight to fall to the ground. Trees of this nature with an undercut would hang in nearby tree tops and in most cases, it would be difficult to completely sever the stem from its stump. With a slant-cut, the stem slips down to the ground and a complete sever results.

Making the Undercut

After the direction of fall has been determined, the undercut is made to guide the tree in the preferred direction.

The depth of undercut will vary with the size of the tree. In a straight well-balanced tree, the bottom of the undercut is sawed horizontally for a distance of one-fourth to one-third of

the diameter of the tree. The undercut is completed by removing a wedge shaped section. When the tree is leaning in the direction of the fall, a deeper undercut of approximately one-third to one-half of the diameter is required to prevent the stem from splitting before it starts to fall.

When a tree is felled against its lean or natural direction of fall, a shallower cut should be made. When a tree is cut against its lean (and occasionally a well-balanced tree) it will require wedging to prevent pinching of the saw, and to force the tree into the direction of the undercut. Wedging can be accomplished only in larger trees; generally ten inches diameter breast height and over. Small, straight, even-crowned trees of approximately four inches diameter breast height should have a more shallow undercut. Trees of this size can easily be pushed by hand to start their fall. Leaning trees of this size should be felled in the direction of their lean, and it should be remembered that the undercut should be deeper than for those that are straight and well balanced.

Severing the Tree

When the undercut has been completed, the severing cut or backcut is started from the opposite side. The backcut should be started one-half inch to four inches above the bottom of the undercut. The backcut should be nearer the four inch height for large trees and the one-half inch height for small trees.

Once a tree starts to fall, the worker should remove the saw from the cut and step to the side well out of danger.

Dangers During Felling Operation

All personnel in close proximity to the tree should step to either side of the tree when the fall begins. Never stand behind or opposite the backcut after the fall starts. The butt end of the tree may kick up and back if the tree is felled uphill, is not properly undercut, or does not fall true due to some interference.

Personnel should look up into the crowns of trees which are destined to be felled, for dead or hanging limbs which might fall once the cutting starts or as the tree begins to fall. Similarly, a tree in falling may brush against another tree knocking dead limbs or lodged material from it. Frequently, trees in falling bend other trees nearly to the ground and when they are suddenly released they may throw limbs or other materials. Sometimes small trees are pinned by their tops to the ground by larger felled trees. Pinned trees exert high tension in the stem and if suddenly released by an axe cut or by severing with a saw, part of the stem will quickly split, striking the person making the release. If it is necessary to cut a stem under tension, stand to one side while making the cut.

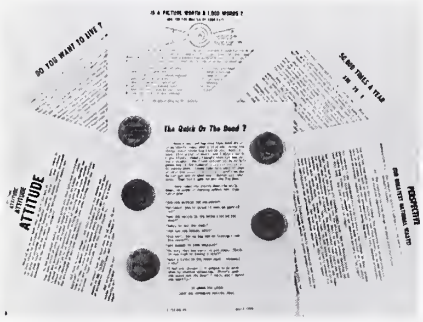
RADFORD ARMY AMMUNITION PLANT CONDUCTS A MOTOR VEHICLE SAFETY PROGRAM

As part of an effort to promote driving safety both on and off plant, Hercules Incorporated at Radford Army Ammunition Plant is presently implementing a sustained motor vehicle safety program.

One element of this program is the National Safety Council's Defensive Driving Course. This course is designed to give drivers the opportunity to learn what is involved in driving defensively, why and how various types of motor vehicle accidents occur and what it takes to prevent them. The course participants are provided with a standard of driving excellence that can be used to evaluate and improve their own driving.

By the beginning of the third month of the program, 300 employees had completed the training. The course is scheduled so as to offer this training to employees with a valid government permit first and to the remaining employees later. It is being conducted by two members of the operating contractor's Training Division of the Security and Personnel Department. They feel that all licensed employees will be "graduate defensive drivers" within a year and a half of the program's initiation.

Radford Army Ammunition Plant classes on defensive driving hold 16 students, which allows employee participation. Mr. Don Brown (right), Training Division, presents a class, utilizing visual aids.



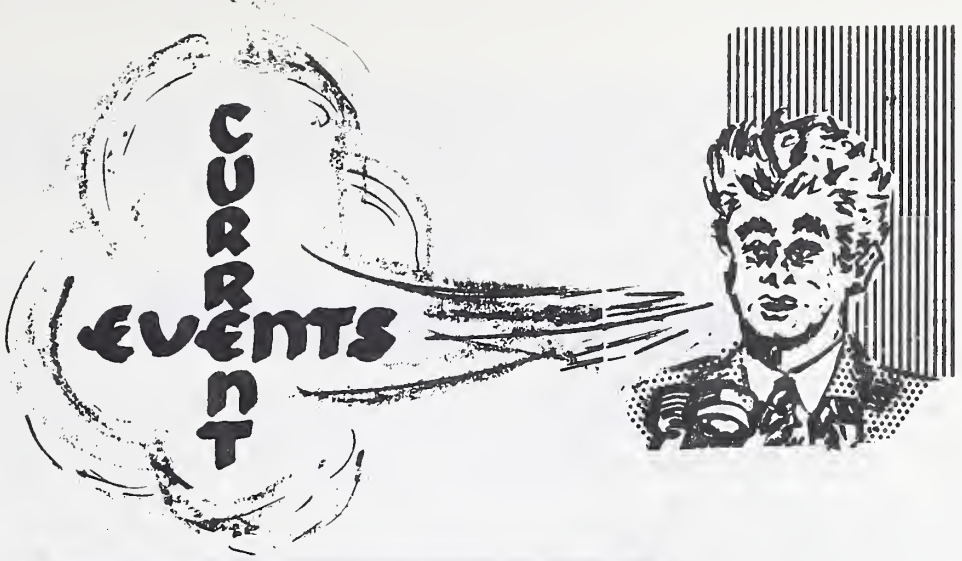
An integral part of the Radford Army Ammunition Plant driving safety program is the use of "Lifeline" bulletins, followed up by memory re-enforcing wooden nickels and tetraflexagons.

In addition to the defensive driving phase of the motor vehicle safety program, the Safety Department is using such techniques as slogans on gate display boards, articles in the plant newspaper, monthly safety literature and music at gate entrances with safe driving comments interspersed.

Another effective element of the motor vehicle safety program is the distribution of "Lifeline" bulletins. These are intermixed, multi-colored one-sheet handouts describing techniques of safe driving or driving philosophy which are distributed weekly to each employee. The bulletins are psychologically reinforced in the memory by the distribution of wooden nickels to the employees, each of which contains one of five different phrases taken from the bulletins. These are redeemable for a cup of coffee through the plant canteen and cafeteria facilities.

Two weeks after the distribution of the wooden nickels, a tetraflexagon is distributed to the employees. The tetraflexagon is a four-sided, two-planed, sequentially-folded, instructional device. This also contains references to the weekly "Lifeline" bulletins using a question and answer format. As the employee folds the tetraflexagon, he can derive hints and answers to driving safety questions.

Radford Army Ammunition Plant safety officials feel that effective and lasting on- and off-plant results will have been realized from the motor vehicle safety program.



RUNAWAY TRUCK TAKES SWIM

An Army civilian employee was collecting refuse with a special purpose garbage truck. In the course of his duties, he began checking litter barrels located near a lake on the installation. In parking the truck on a slight grade (10%), the employee pulled up the hand brake, placed the vehicle in gear, applied the hand brake and shut off the engine. This was customary procedure when parking on an incline.

Shortly after the driver had disembarked from the truck, the vehicle began to roll down the grade. The driver jumped back into the truck and applied the foot brake. When this effort failed, he attempted to shift the moving vehicle into reverse but could not engage the gears. Further efforts to stop the vehicle with the hand brake were also unsuccessful. The driver jumped from the truck as it approached the bank of the lake. The runaway vehicle sideswiped a parked pick-up before stopping.

The truck involved in this incident was tested on a similar grade and it was determined that the air brake and clutch were defective. The accident might have been prevented had the driver chocked the wheels of the truck. There were no injuries and total damage was approximately $360.00.

Employees have been reinstructed to check for and report all equipment deficiencies. Correction of such deficiencies has been re-emphasized in light of safety taking precedence over normal operational requirements.

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MACHINE CATCHES FINGER

A contractor employee was performing her assigned duties near a base plug insertion machine on an automated 40mm assembly line. This machine presses M2 propellant-loaded base plugs into cartridge cases as the latter move along a power conveyor. The pressing ram is actuated by means of an air sensor that detects the presence of a properly positioned base plug. If a base plug is not located properly, the cartridge case will not index and the machine operation ceases.

The machine in question had stopped running when a base plug jammed in the track which shuttles the plugs into the pressing position, With her left hand, the employee manually dislodged the base plug and placed it in the pressing position. This action caused the ram to automatically cycle, trapping the worker's finger between the base plug and a cartridge case. The employee suffered a partial amputation of the left middle finger.

The worker's failure to comply with operating procedures was the key factor surrounding the incident. She neglected to operate a stop switch located on the side of the machine prior to placing her hand in a vulnerable position. The worker also acted without authority. Such machine adjustments, by procedure, were the responsibility of maintenance personnel.

In an effort to preclude the occurrence of similar accidents, the installation is redesigning the base plug shuttle jaws to minimize jamming of the base plugs. The employee was reprimanded for her disregard of operating procedures.

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USE OF SCREWDRIVER BACKFIRES

Two Army employees withdrew five solid propellant test motor grains from "cure" in preparation for static ballistic evaluation. Inspection of the test motors was initiated and four of the five motors were found to be acceptable for firing.

The remaining motor was rejected because the propellant was found to be partially debonded from the interior wall of the motor case. It was felt that the debonding was so

extensive that the propellant could be removed from the motor case without use of force. Had this assumption not been made, the test motor would have required remote burnout as required by procedures.

An operator attempted to remove the propellant grain; however, the partial bonding prevented release. The employee then began prying with a screwdriver between the propellant and the case wall. Sufficient force was applied to cause ignition of the propellant. Although the operator was attired in goggles, shoes and flame-resistant coveralls, he sustained second and third degree burns on his face, hands, hips and stomach. There was no property damage.

Analysis of this accident indicated that the propellant ignition occurred because of friction and/or electrostatic force generated by the operator's use of a prying tool. This act was preceded by the operator's misjudging the extent of debonding.

MOWER OPERATOR MOWED DOWN

A contractor employee was mowing the earth barricade surrounding a Richmond-type magazine with a tractor mowing machine. After mowing one swath forward to the front of the magazine, the operator backed the tractor approximately 30 feet and began forward for a second swath with the tractor wheels positioned in the swath cut on the previous pass.

Near the headwall at the front of the magazine, the operator suddenly approached a slight incline. He attempted to back away from the headwall but the weight of the mowing machine continued to pull the equipment forward.

As the mower reached the headwall, the operator jumped from the equipment to the pavement, breaking his jaw and arm on impact. The left rear wheel of the overturning mower then struck the operator, fracturing his leg. Mower damage was less than $700. (See Photo.)

The cause of this accident was attributed to the operator's failure to recognize the hazard of negotiating a sloped surface. Actions taken to prevent similar occurrences were as follows:

1. The incident was discussed in detail with all personnel associated with mowing operations.

2. All mowing machine operators were taken to the accident site for a graphic briefing of the accident.

3. Supervision will maintain closer surveillance over mowing operations.

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SWINGING SLING STRIKES OPERATOR

Three Army employees were loading sheets of armor plate onto a lowboy trailer by means of a 20-ton mobile crane. The first plate was rigged, swung and placed on the trailer without incident.

Prior to movement of the second plate, a pair of 7-inch plate lifters were rigged to both sides of the load. A plate thickness of three inches necessitated the wedging of the gaps between the surfaces of both plate lifters and the load. This was accomplished by means of a 4-inch wedge on one side and a 2 3/4 inch block on the other. The plate lifters, wedge and block are shown in Photo 1.

The crane operator, after swinging the load toward the trailer, raised the load slightly and in doing so, the front end of the crane began to raise off the ground. The edge of the suspended load hit the trailer causing the wedged plate lifters to disengage, dropping the load. As the then-empty plate lifters swung back toward the crane cab, one struck the door frame, bouncing off and striking the right leg of the operator. Photo 2 shows the position of the dropped plate. The point of impact of the swinging plate lifter and the position of the operator's right leg are shown in Photo 3.

Damage to the door frame of the cab was minor and no damage was incurred by the falling load. The operator suffered a compound fracture of the right leg.

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TRUCK THROWS RIDERS

Members of an MP company were being relieved from duty at shift change. Under normal conditions these men were taxied to and from their duty sites in a 20-passenger bus. This bus, however, was undergoing maintenance and a 2 1/2-ton truck was being utilized as a substitute means of transportation.

Two enlisted men boarded the truck. One took his seat on the left seat panel while the other sat toward the rear on the truck bed. As the driver shifted from first to second gear, the truck surged forward, perhaps as a result of premature clutch engagement. This sudden movement threw both passengers from the truck bed onto the pavement. Estimated speed of the vehicle at the time of the accident was 10-15 mph.

Both men suffered skull fractures and concussions as they struck the pavement. The truck had not been equipped with the usual safety features found on a truck used for troop transport; e.g., safety chain or belt, tailgate, etc., and the driver, duly licensed as a 2 1/2-ton truck operator, had not checked to insure the safe positioning of his passengers.

All drivers have been reinstructed as to the hazards involved in operating equipment lacking necessary safety devices. The MP company has been made aware of the importance of safe procedures in off-duty situations as well as those on duty.

PREVENT THOSE COOKING FAT FIRES

(Every year the Army Materiel Command total of recordable fires includes some caused by overheated cooking fats and similar substances on stove burners. No doubt many more are not included in the accident experience because damages below $100 are not recordable accidents. Grease fires which occur off post in the homes of AMC employees also cause large damage losses. Compliance with the simple rules stated in the following article should prevent most of these fires.)

Cooking fat fires occur when the grease is overheated and boils over onto the hot heating coils causing the flammable fats to ignite. Usually the fat overheats when it is left unattended after the heating unit is turned on "high" to bring the fats to a cooking temperature quickly. Often the fats overheat as the result of the cook mistakenly turning the control knob to "high" when the "off" position is intended.

Once the hot grease ignites, a roaring fire ensues with the grease feeding the fire from its own hot flammable gases.

In some cases the fire may be smothered by placing the top on the cooking container. Baking soda may also be used to smother small grease fires. Placing a larger container over the entire unit, smothering out all air, is another method to use. In all cases, the fire should be smothered. NEVER ATTEMPT TO EXTINGUISH A GREASE FIRE WITH WATER.

The grease fire should be extinguished on the spot when at all possible.

The dry chemical or carbon dioxide fire extinguisher should be kept near the cooking facility at all times. Suitable inexpensive home fire extinguishers may be purchased at most department stores. The fire extinguisher purchased should be rated for "ABC" or "BC" classes of fires.

Here are some pointers to avoid fires or accidents from hot cooking fats:

1. Keep handle of cooking containers pointed away from the edge of the stove.

2. Be sure that babies or pets do not get under foot.

3. Bring cooking oils and fats to the desired temperature slowly.

4. Never leave the pot unattended.

5. Make sure you have turned the heating control button to the intended setting.

6. Don't attempt to run out of the house with a burning pot or pan.

7. Keep a proper fire extinguisher handy.

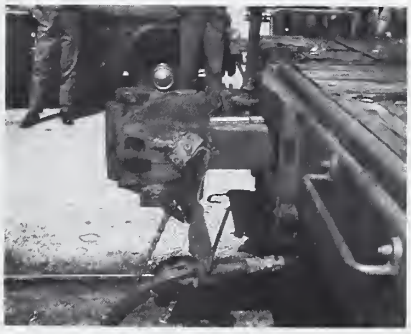
Footnote: Should you sustain a grease fire burn, the best first aid is to bathe the area with cold water and go to a doctor immediately. A clean cloth, saturated with clean water may be loosely applied about the burn until you can get to the doctor.

Accident Prevention & Loss Control Program, Huntsville Div., Thiokol Chemical Corporation.

RAIL CAR SWITCHING ACCIDENT

A rail crew at an Army installation was in the process of switching rail cars. During an attempt to couple a cut of five flat cars, the couplers failed to match properly. While one of the crewmen was making adjustments to the coupler and knuckle, the coupler on the flat car sprang toward the locomotive, jammed against the locomotive coupling, and crushed the crewman's right arm and hand.

A Flat Car with the Coupler in a Fully Extended Position*



A Flat Car with the Coupler in a Partially Compressed Position*

An investigation revealed that during the initial coupling attempt, the coupler on the flat car was depressed approximately twelve inches and failed to release when the locomotive backed off. The adjustment made by the crewman caused the coupler to release and spring forward.

The flat car involved in this accident was equipped with a super-cushioning device consisting of a spring type draft gear and a long coupler. The distance between the compressed and released positions may be as great as 30 inches on some equipment of this type. It is not uncommon for this equipment to remain partially or fully compressed after a coupling attempt. Moving the coupler to the right or left will usually cause it to spring out to its normal extended position.

An Underframe View of a Flat Car Equipped with a Super-cushioning Device

In order to prevent this kind of accident, all rail crewmen should be warned of the hazards associated with rail cars equipped with super-cushioning devices. Extreme caution should be used in adjusting couplers, and at no time should any part of the body be placed in front of the coupler. As an added precaution, rail cars should be separated by half a car length before making adjustments to the couplers.

*Editor's note. The broken weld seen in the photographs was not related to this accident.

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AR 95-2, 8 May 70. Aviation - Flight Regulations for Army Aircraft.

AR 385-40, Ch 1, 9 Jul 70. Safety - Accident Reporting and Records.

AR 385-55, 21 Jul 70. Safety - Prevention of Motor Vehicle Accidents.

AR 420-90, 22 Apr 70. Facilities Engineering - Fire Prevention and Protection.

AMCR 385-26, Ch 1, 13 Jan 69. Safety - Aviation Safety.

AMCR 385-29, 21 Apr 70. Safety - Laser.

AMCR 420-4, 29 Apr 70. Facilities Engineering - Fire Department Training.

AMC Supplement #1 to AR 385-12, 15 Jun 70. Safety - Fire Report.

AMC Supplement #1 to AR 385-40, Ch 1, 27 Mar 70. Safety - Accident Reporting and Records.

SB 3-4240-1, 23 Jun 70. Breathing Apparatus, Self Contained, M23 Storage Serviceability Standard.

(Continued on page 41)

ARE YOU A BELIEVER?

Russell H. Cors
Production Division Coordinator
Olin Corporation
Badger Army Ammunition Plant

How many times have you come away from your safety meeting with the feeling, "That meeting was a big flop."

Your material had been uninteresting and you had hardly read it yourself. To make matters worse, you had mixed up your pages. While you were making your presentation the blank faces and mutterings of conversation had plainly indicated that your audience was not paying attention. While you would never admit it, you knew the whole affair could be marked off as a waste of time. Why?

Some of the reasons for our lack of success are obvious but let's analyze our problem a little further.

All supervisors, regardless of position or level, should know the importance of safety awareness and the function of the regular safety meeting in achieving this goal. Constant presentation of the safety program objectives and safety ideas to employees is a good and proven idea.

How do you feel about your safety meetings? What have they come to mean to you? Do you look forward to them or face them unenthusiastically? Have you had to realize that your workers have developed an immunity to your approach and are no longer interested or responsive? The honest answers to these questions may give you the answer to your safety meeting problems.

I once heard a supervisor open a meeting with the remard, "Well, we got to have another safety meeting!" The remark was delivered in a sarcastic tone and implied to all that the job was distasteful. His statement could only mean that he felt he was being forced to hold the meeting. Without realizing it, he had defeated himself before he started. Whatever message he had to give would be ignored because he had given the feeling that he did not believe in it himself.

The crux of the matter consists of belief and interest.

We cannot all be brilliant public speakers with the talent to hold an audience spellbound. We cannot all have the ability of a top-notch salesman. No one expects this. But we can all present material that we find interesting and believable. Regardless of how technical your program is, if you approach your subject with interest and enthusiasm, the feeling will be contagious. If you show your workers that you truly believe in the safety message you are presenting, they will be more likely to become believers in safety too. If interest and belief are lacking, your workers will recognize it instantly and will respond in the same manner.

Another important factor is preparedness. Whether you are using a prepared subject text or speaking "off the cuff" the best material in the world can go flat if poorly presented. Fumbling and mumbling or simply standing there reading your sheet makes an uninteresting program and leads to wandering attention. Prepare and organize your material well enough so that you are familiar with the subject matter and can add the touch of real enthusiasm. Even mediocre material can come to life if a little personal pep is added.

If you set about correcting the things we have discussed, it may be that you will leave your next safety meeting with the feeling, "That was a real good job!"

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GUARDING SHOWS RESULTS

Over fifty years ago when Workmen's Compensation first came into existence one of the first safety measures undertaken by industry was to improve the guarding of machinery. Throughout the ensuing years the effect of such efforts can be measured by the steady reduction of accident occurrences.

Guards on machines are valuable because they stand between human flesh and the repetitive automatic action of machines or motors. Guards function when people fail to do so, and by so doing prevent injury to the human flesh.

Guards alone are not the substitute for complete employee cooperation. The reason for this is obvious. Both mechanical and electrical principles applied to guarding are subject to failure themselves.

A guarding program for any particular operation should first concern itself with the possible elimination of hazardous processes or work moves, to go along with any built-in devices which will assure safety. Keeping hands out of the danger zone should be a number one premise when looking for solutions to either approach.

Guards are only as good as their physical condition, and therefore a regular examination and maintenance program should exist for them. Along with this is the need to indoctrinate employees that guards must be replaced if repair work necessitates their removal and that broken or defective guards should be reported to supervisory personnel immediately.

New machines are designed with many safety features incorporated. The problem which remains is in educating employees to utilize guards wherever applicable and to understand that it takes the cooperation of the operator or employee to really guard against accidents.

Safety News, The Ontario Pulp & Paper Makers, Safety Association.

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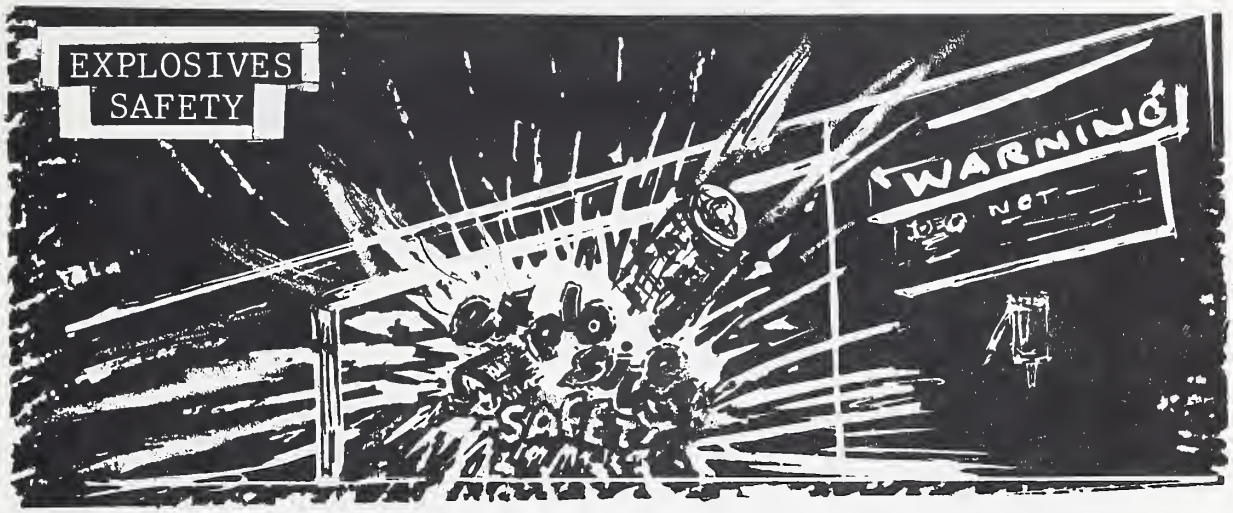


BARRICADES, SHELTERS AND STATIC TEST STANDS

Safety Division
Aberdeen Proving Ground

The hazards inherent in any explosive operation at APG make it imperative that personnel and equipment be protected by suitable barricades, operational shields and test stands properly designed to preclude loss of gun or launcher during firing tests.

Supervisors should review each test set-up or explosive operation for safety, efficiency and proper design taking into account the following:

1. The quantity of explosives involved.

2. The potential initiation hazard.

3. Adequate SOP.

4. Personnel exposure.

Hazards that may be encountered during processing/firing of ammunition/explosives may include but are not limited to the following:

1. Detonation of the explosives or propellant.

2. Improper sequence of operations.

3. Utilization of personnel not qualified for a specific job.

4. Fires involving unconfined explosives.

5. Weapon failure.

6. In-bore prematures.

7. Items not properly secured that may take flight upon ignition or detonation.

In the research and development of rocket motors, mortars and artillery type ammunition, and when working with new type propellants, malfunctions, explosions, detonations and fires may occur.

If safe and efficient testing of explosives and weapons are to be conducted, facilities must be carefully planned for safety, efficiency and quality. Operations must be carefully coordinated with all affected elements of the organization.

Anyone who handles ammunition or explosives should remember one simple basic rule: Respect the material with which you are working. If you lose that respect for one moment the result may be undesirable and disastrous.

LEAKING CYLINDER IGNITES

E. R. Coffman, Safety Office
Aberdeen Proving Ground

A welder was fabricating a metal weapons rack and was using a portable electric grinder to smooth the welded surface. Upon completing the grinding operation, the employee suddenly noted flames from the top of a nearby acetylene cylinder. A fire call was placed and personnel were evacuated from the building. The installation Fire Department responded and soon had the blaze under control. The burning acetylene melted the fusible safety plug located in the top of the cylinder. This allowed continued combustion but reduced the potential for detonation.

The acetylene cylinder was part of a portable welding unit located approximately seven feet from the grinding operation (see photo 1). The probable cause of the fire was sparks from the grinding operation igniting acetylene from a leaking cylinder. Wall and cylinder charring can be seen in photo 2.

To preclude the occurrence of a similar incident, the following precautions are being taken:

1. Portable welding units will not be placed near a grinding operation or other operations which produce sparks or generate heat.

2. If the room is small, a nonflammable screen should separate the grinding operation from other activities.

3. Check all connections for tightness upon installation of a new acetylene cylinder in a portable welding truck. If leaks are suspected, all connections should be tested by covering them with soapy water.

4. Upon completion of any welding operation, the cylinder valve will be closed and regulator and hoses bled of all gases.

5. In storage, all acetylene cylinders will be protected from the direct rays of the sun.

6. If the cylinders are in outdoor storage, they will be stored on dunnage to prevent rust from moisture in the ground.

7. Empty cylinders will be placed in separate storage and properly secured in an upright position. They will be marked "empty" with DA Label 73.

8. Upon receipt of cylinders from a supplier, soapy water tests should be accomplished prior to placing in storage.

9. All acetylene cylinders should be kept in an upright position to prevent "acetylene blowing" through the valve and torch.

HOW TO AVOID THE INTERSECTION COLLISION

Fred R. Shavers, Safety Engineer
Thiokol Chemical Corporation
Longhorn Army Ammunition Plant

One of the most dangerous points on any highway is where it intersects another road. Following are three good reasons why.

Delayed Perception: No one knows how many drivers have accidents at intersections because of delayed perception, but it is estimated that the number is about 60 per cent. A driver's perception of a car on collision course with his is delayed because he doesn't look for that other car. Usually, delayed perception is due to his distraction, confusion, or other competing hazards which occupy his attention while the ultimate hazard rapidly develops.

Speed: Thirty per cent of the drivers are traveling so fast by the time they perceive the hazard that they have already passed the point of escape. A driver may see another car as soon as it becomes visible -- from behind a building, for example -- but then it's too late.

False Assumptions: The remaining 10 per cent of drivers who get into intersection accidents do so because a driver assumes that another driver will do something he doesn't do or will not do something he does. Just because you've got the right-of-way, for example, doesn't mean the other driver is going to wait politely and let you keep it.

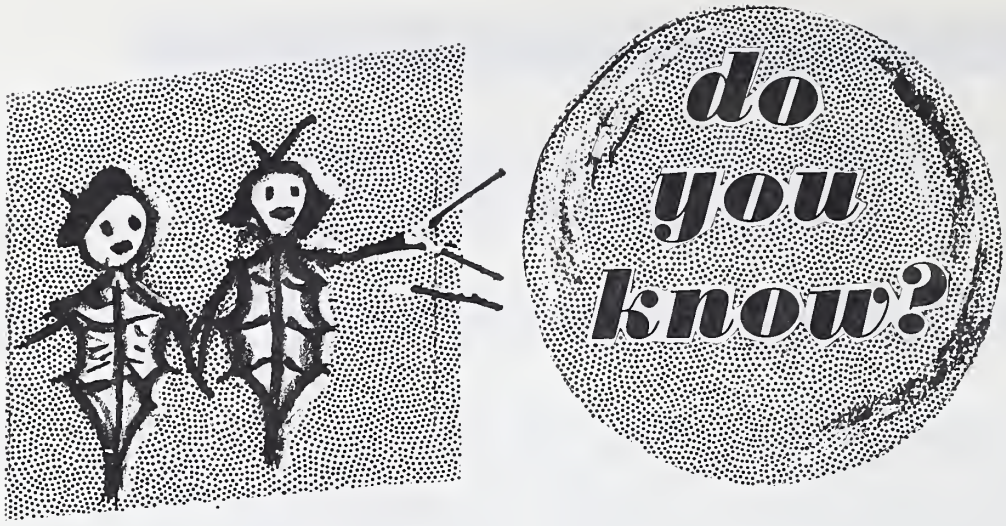
There are four principal means of avoiding intersection accidents:

1. Match speed with visibility at intersections. Always slow down to a speed at which you can stop short of the intersection if a vehicle comes into view on the cross street. You cannot be sure that the driver will stop his car for you.

2. Be alert. Resist distractions. Look in all directions, then look again.

3. Don't assume anything, except that all other drivers are blind or homicidal.

4. Don't stake your life on your right-of-way. Don't, for example, stop at an intersection, then blithely proceed without looking for other cars since you have the right-of-way.



Here are ten questions that will test your knowledge of safety requirements that you will need under different circumstances. The answers to all of them may be found in AMCR 385-100. How many can you answer without referring to the regulation?

1. Are there any restrictions on the use of static combs for dissipating the generation of static electricity?

   Answer and reference:

2. The inspection, testing and maintenance of cranes must comply with the requirements of what regulations?

   Answer and reference:

3. What precautions should be taken when refrigerators and/or deep-freeze cabinets are being stored in buildings where unauthorized entry is possible.

   Answer and reference:

4. What would be the minimum separation required between a storage block consisting of earth-covered magazines with reinforced concrete front walls and a storage block consisting of other types of magazines?

   Answer and reference:

5. What fire symbol should be used to indicate the presence of flammable liquids such as solvents, oils and paints?

   Answer and reference:

6. Are contact lenses considered to afford suitable eye protection to their wearers?

   Answer and reference:

7. What restrictions are placed upon concurrent chemical investigation of incompatible materials such as fuels and oxidizers?

   Answer and reference:

8. What rotation direction is required for radial saws:

   Answer and reference:

9. Are portable fire extinguishers required in warehouses protected by automatic sprinklers if ordinary combustibles are being stored?

   Answer and reference:

10. In what manner must sodium peroxide fires be extinguished?

    Answer and reference:

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REFERENCE PUBLICATIONS
(Continued from page 31.)

TB 55-1500-314-25, 3 Feb 70. Handling, Storage and Disposal of Self-Luminous Aircraft Instruments and Markers, and Aircraft Engine Ignition Excita Units Containing Radioactive Material.

TB 750-248, 10 Apr 70. Instructions for Safe Handling, Maintenance, Storage and Disposal of Radioactive Commodities Managed by US Army Mobility Equipment Command.

TB 750-249, 26 Feb 70. Instructions for Safe Handling and Identification of US Army Electronics Command Managed Radioactive Items in the Army Supply System.

YOUR SIMPLE IDEA MAY PREVENT ACCIDENTS

There is a real need for "simple" ideas that will increase the safety of your work and your outside activities.

Most accidents are rather simple, easily preventable events. Had John managed to get a full night's sleep, he would not have nodded at the wheel. If he had driven a little slower, his car would not have run off the road at the sharp curve. Had he fastened his seat belt, he would not have been thrown out when the vehicle overturned.

All around you there are simple ideas that have been put to beneficial use. Consider the simple line painted on the highway. For a long time it was not there. Finally someone painted the line down the center of the road. It made it easier for the driver to stay inside his half of the road, and it reduced the likelihood of head-on collisions and sideswipe accidents. The public liked and accepted the line.

After years passed someone thought of a new use for the white highway line. Why not a white line to show the edge of the highway as well as the center? The idea was tried and it worked. The line made it easier for the driver to stay on the road, and has prevented countless accidents.

Here are a few suggestions that may halp you to develop useful ideas and get them into use:

1. The idea need not be abstract or complex to be useful. There is nothing complex about painting lines on pavement, yet these prevent accidents.

2. There is room for application of fresh ideas in old fields, as well as in the newer more exotic ones. Even though a job has been done in a certain way without an accident for many years, there may be an unnoticed hazard in the procedure.

3. A simple, old-time method, brushed up a bit, may be just what is needed to cope with a current problem.

4. There may be another use for something already being used. That white line on the pavement is an example.

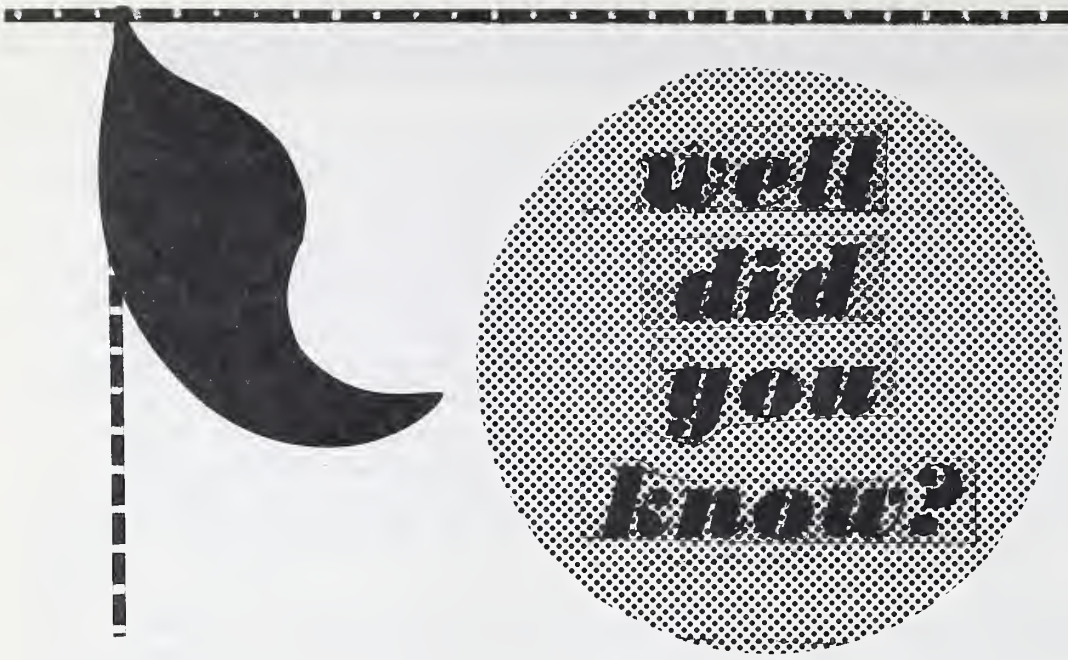
5. Try turning an accepted idea upside down or backwards. An example is the farmer who grows tomatoes. Once he had to pick them day after day as they ripened. This required much costly labor. Someone asked the question, "Why not develop a variety whose tomatoes all ripen at once, like many other plants?" The variety was developed. Now the farmer uses a machine and harvests the entire crop in one operation.

6. Examine an idea or practice to see if it actually serves any purpose. Our farmer's ancestors believed that corn required frequent cultivation as it grew. Scientists questioned this and demonstrated that cultivation damaged the corn, wasted moisture, was harmful to the soil, and was a needless use of labor, equipment and fuel. The farmer now applies fertilizer, plants his corn, sprays a weed control chemical and leaves the field undisturbed until harvest time.

7. Do not expect every idea to receive an eager reception and prompt adaption. Christopher Columbus had a good idea and a sound argument for it, but he had a terrible time getting backing to prove it. His backers thought about his proposal for a long time.

8. Perhaps you may have to "plant" your idea in such a way that someone else will "think" of it and put it into effect. Some individuals are very skillful at getting their ideas adopted by planting them. They may not receive the recognition due them, but they have the satisfaction of getting something accomplished.

Why bother with a suggestion if it is going to be so difficult to get an idea put into use? Some individuals do give up and vow, "Never again", after one or two failures. The individual who truly desires progress will not be deterred by failure. He will try again and apply more ingenuity in selling his old and new ideas.



Here are the answers to the questions on pages 40 and 41 All questions were based on information contained in AMCR 385-100. A reference to the pertinent paragraph follows each answer.

1. Yes. Static combs must not be used to drain off static generated from belting or pulleys used in locations where hazardous concentrations of explosives dust or flammable vapors are present. Reference: Paragraph 7-3.

2. Inspection, testing and maintenance of cranes will be in accordance with AMCR 750-25, Inspection, Testing and Maintenance of Lifting Devices. Reference: Paragraph 9-5d.

3. The units shall have their doors disengaged from the hinges and strapped to the units. Strapped doors shall be wedged open at least one inch to provide for free circulation of air to the refrigeration compartment, to prevent development of objectionable odors. Reference: Paragraph 9-37a.

4. A separation of not less than 1200 feet is required between storage blocks of earth-covered magazines with reinforced concrete front walls and blocks of magazines of other types. Reference: Paragraph 17-10c.

5. Symbol "+" is the proper fire symbol for indicating the presence of flammable liquids such as solvents, oils and paints. Reference: Paragraph 12-23b.

6. No. Contact lenses cannot be considered as substitutes for appropriate eye protection. Reference: Paragraph 10-8b.

7. Simultaneous chemical investigation of incompatible materials such as fuels and oxidizers shall not be conducted by one person, nor in adjacent work areas that are not separated in a manner to prevent mixing. Reference: Paragraph 4-4b.

8. Radial saws must rotate upward toward the operator and this direction must be conspicuously marked on the hood. Reference: Paragraph 9-24b.

9. In warehouses protected by automatic sprinklers and used for the storage of ordinary combustibles, Class A fire extinguishers will be provided in accordance with AR 420-90. Reference: Paragraph 12-19c.

10. Sodium peroxide fires must be smothered with sand, ashes, dirt or rock dust. Reference: Paragraph 13-15c.

KNOW YOUR FIRE EXTINGUISHERS

TYPE OF EXTINGUISHER		WATER			WATER SODA ACID	FOAM	CARBON DIOXIDE	DRY CHEMICAL			
								SODIUM OR POTASSIUM BICARBONATE		MULTI-PURPOSE ABC	
		STORED PRESSURE	CARTRIDGE OPERATED	PUMP TANK				STORED PRESSURE	CARTRIDGE OPERATED	STORED PRESSURE	CARTRIDGE OPERATED
											
CLASS OF FIRE A	WOOD PAPER RUBBER PLASTICS	YES	YES	YES	YES	YES	NO	NO	NO	YES	YES
CLASS OF FIRE B	FLAMMABLE LIQUIDS GASES GREASES	NO	NO	NO	NO	YES	YES	YES	YES	YES	YES
CLASS OF FIRE C	ELECTRICAL EQUIPMENT	NO	NO	NO	NO	NO	YES	YES	YES	YES	YES
USUAL OPERATION		PULL PIN SQUEEZE HANDLE	PULL PIN SQUEEZE HANDLE	PUMP HANDLE	TURN UPSIDE DOWN	TURN UPSIDE DOWN	PULL PIN SQUEEZE HANDLE	PULL PIN SQUEEZE HANDLE	PULL PIN SQUEEZE HANDLE	PULL PIN SQUEEZE HANDLE	PULL PIN SQUEEZE HANDLE
RANGE		30'–40'	30'–40'	30'–40'	30'–40'	30'–40'	3'–8'	5'–20'	5'–20'	5'–20'	5'–20'
DISCHARGE TIME		1 MINUTE	1 MINUTE	1 MINUTE	1 MINUTE	1 MINUTE	8–30 SEC.	8–25 SEC.	8–25 SEC.	8–25 SEC.	8–25 SEC.
SIZES		2½ GAL.	2½ GAL.	2½–5 GAL.	2½ GAL.	2½ GAL.	2–20 LBS.	1–30 LBS.	2½–30 LBS.	2½–30 LBS.	8½–30 LBS.

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WASHINGTON, D.C. 20315